FACTS ON FILE

EMSP

Environmental Management Science Program

Project Highlights

The Environmental Management Science Program (EMSP) is funding basic research projects focused on solving the most difficult problems that threaten the closure plans of DOE sites. This fact sheet highlights just one.

Extraction and Recovery of Mercury and Lead from Aqueous Waste Streams Using Redox-active Layering Metal Chalcogenides

There are numerous practical reasons for selectively separating heavy metals ions, such as mercury and lead, from aqueous media. A few examples are the remediation of contaminated ground water, the remediation of hazardous or radioactive waste, and the recovery of precious and/or toxic metals from industrial processing solutions. Current technologies for the selective extraction of mercury and lead need to be improved or replaced for the following reasons: (a) selectivity for mercury and lead should be improved; (b) decontamination factors should be increased; (c) recovery of mercury and lead from the extractants should be required to allow for recycling and reuse of the extractants, lower costs, and minimization of the volume and mass of the final waste form.

This research is concerned with removing soft, heavy metal ions from aqueous solutions, as well as extraction of these metal ions from contaminated soils. Safe, efficient, and cost effective separation and recovery of these metals ions from waste streams is therefore an important scientific and technological goal.

Locations: Colorado State University

Year of Award: 1996

Amount of Award: $333,000

Office of Environmental Management (EM) Problem Areas: Mixed Waste (primary), Decontamination and Decommissioning

Office of Science (SC) Scientific Category/Sub-Category: Separations Chemistry/Ligand Design and Ion Exchange

Research Value/Impact: Researchers decided to study the mechanisms of activation, extraction, deactivation, and recovery of the extractant and the target ion, since two of the lithium-intercalated transition metal dichalcogenides investigated showed promise as effective, selective, and redox-recyclable extractants for heavy metal ions from aqueous solution. Based on their results, heavy-metal ions were removed from a solution by a reversible ion-exchange process with the negatively charged metal chalcogenide layers. Additionally, there are new alkali-metal-intercalated metal chalcogenides that remain to be investigated.

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More Information on the Web:
http://www.em.doe.gov/science or
http://www.id.doe.gov/emsystems/emsp